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(54) RECORDING MEDIUM AND MANUFACTURE OF RECORDING MEDIUM

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a recording medium which is highly absorptive to ink and ensures ink fixing properties and further, a highly sharp image as well as method for manufacturing the recording medium.

SOLUTION: In the recording medium having an ink receiving layer, the ink receiving layer is characterized by being composed mainly of a light transmissible resin and is of a porous structure. Further, in the method for manufacturing the recording medium having the ink receiving layer, a

coating liquid containing the light transmissible resin as a main component is applied to a base material to form a coating layer after the stirring of the coating liquid to generate minute bubbles or the coating liquid containing the light transmissible resin as a main component of the ink receiving layer and a specific solvent which forms holes in the ink receiving layer by vaporization, is applied to the base material to form the coating layer following the stirring of the coating liquid in such a way that the minute particles of the specific solvent are dispersed. In addition, the coated layer is dried to make the ink receiving layer structurally porous.

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CLAIMS

[Claim(s)]

[Claim 1]A recording medium, wherein the main ingredients of this ink absorbing layer are light transmittance state resin in a recording medium which has an ink absorbing layer and this ink absorbing layer is porous structure.

[Claim 2]The recording medium according to claim 1 having a penetrating port which the above-mentioned porous structure penetrates to a thickness direction of an ink absorbing layer.

[Claim 3]The recording medium according to claim 1 or 2, wherein the above-mentioned light transmittance state resin is a water soluble polymer.

[Claim 4]The above-mentioned water soluble polymer Polyvinyl alcohol, cation denaturation polyvinyl alcohol, A carboxynitrocellulose, carboxymethyl cellulose, hydroxyethyl cellulose, The recording medium according to claim 3 including at least one kind in ethyl cellulose, polyacrylamide, an acrylic resin, starch, cation denaturation starch, gelatin, GAZEIN, and these denaturation compounds.

[Claim 5]The recording medium according to any one of claims 1 to 4, wherein the above-mentioned ink absorbing layer contains an ink fixing agent.

[Claim 6]The recording medium according to any one of claims 1 to 5, wherein quantity of the above-mentioned ink absorbing layer is $0.5 \text{ g/m}^2 - 150 \text{ g/m}^2$.

[Claim 7]The recording medium according to any one of claims 1 to 6, wherein air permeability specified by air permeability JIS-P8117 is 100 or less seconds/100 cc.

[Claim 8]The recording medium according to any one of claims 1 to 7, wherein the above-mentioned recording medium is a recording medium for ink jets.

[Claim 9]In a manufacturing method of a recording medium which has an ink absorbing layer, coating liquid which contains light transmittance state resin as the main ingredients of this ink absorbing layer, A manufacturing method of a recording medium characterized by making this ink absorbing layer into porous structure by carrying out coating of this coating liquid to a substrate, forming a coating layer, and drying this coating layer after stirring so that detailed air bubbles may be made.

[Claim 10]In a manufacturing method of a recording medium which has an ink absorbing layer, as the main ingredients of this ink absorbing layer, light transmittance state resin, Coating liquid containing a specific solvent which can form a hole in this ink absorbing layer by volatilizing, A manufacturing method of a recording medium carrying out coating of this coating liquid to a substrate, forming a coating layer, volatilizing this specific solvent by drying this coating layer, and making this ink absorbing layer into porous structure after stirring so that detailed particles of this specific solvent may distribute.

[Claim 11]A manufacturing method of a recording medium making the coating liquid according to claim 9 or 10 contain a surface-active agent.

[Claim 12]A manufacturing method of the recording medium according to claim 11 using the above-mentioned surface-active agent as a carboxylic type polymer surfactant.

[Claim 13]A manufacturing method of the recording medium according to claim 11 or 12 characterized by making an addition of the above-mentioned surface-active agent into 0.1 or less copy to a material weight section which constitutes the above-mentioned coating layer.

[Claim 14]the above -- a manufacturing method of the recording medium according to claim 9, 11, 12, or 13 setting mean particle diameter of detailed air bubbles as 1.5 micrometers or less.

[Claim 15]A manufacturing method of the recording medium according to claim 10, 11, 12, or 13 using as the above-mentioned specific solvent a solvent of nonaqueous solubility which is while the boiling points are 50 ** - 150 **.

[Claim 16]A manufacturing method of the recording medium according to claim 10, 11, 12, 13, or 15 using the above-mentioned specific solvent as petroleum system hydrocarbon.

[Claim 17]A manufacturing method of the recording medium according to claim 10, 11, 12, 13, 15, or 16 setting mean particle diameter of detailed solvent particles of the above-mentioned specific solvent as 1.5 micrometers or less.

[Claim 18]A manufacturing method of the recording medium according to any one of claims 9 to 17 performing the above-mentioned stirring using any at least one sort of a homogenizer, a high flex time mixer, and the ultrasonic dispersion machine.

[Claim 19]A manufacturing method of the recording medium according to any one of claims 9 to 18 characterized by drying the above-mentioned coating layer so that it may have a penetrating port which the above-mentioned porous structure penetrates to a thickness direction of the above-mentioned coating layer.

[Claim 20]A manufacturing method of a recording medium making a manufacturing method of the recording medium according to any one of claims 9 to 19 into a manufacturing method of a recording medium for ink jets.

[Claim 21]A sheet like object, wherein a penetrating port penetrated to a thickness direction of this coating layer by having carried out coating of the coating liquid to a substrate, having formed a coating layer, and having stirred so that air bubbles in which are the sheet like object obtained by drying this coating layer, and the above-mentioned coating liquid is detailed might be made is formed.

[Claim 22]It is the sheet like object obtained by carrying out coating of the coating liquid to a substrate, forming a coating layer, and drying this coating layer, When a specific solvent which can form a hole in a sheet like object because the above-mentioned coating liquid volatilizes was contained, it stirred so that detailed particles of this specific solvent might distribute, and this specific solvent volatilized at the time of the above-mentioned desiccation, A sheet like object, wherein a penetrating port penetrated to a thickness direction of this coating layer is formed.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to a recording medium and the recording medium for ink jets in which especially quality image recording is possible.

[0002]

[Description of the Prior Art] The ink jet recording which uses the conventional recording medium and the recording medium for ink jets in which especially quality image recording is possible has spread quickly in the use of versatility [ease / a high speed, a low noise, and multiple-colorizing /, and / development and fixing / features /, such as needlessness,]. Since it is becoming possible to obtain a so much equal recorded image even if it compares with process printing by a platemaking method, or the print by a film photo method the picture formed by a multicolor ink jet recording method, it is being widely applied even to the full color ink image record field.

[0003] As a recording medium used in an ink jet recording method, the paper of fine quality used for the usual printing etc., coated paper, the recording medium recently for ink jet recording methods, etc. are used increasingly.

[0004] However, the demand of the more advanced characteristic is increasingly made also to a recording medium with the improvement in performance and the expansion of a use in an ink-jet recording device like improvement in the speed of record, high-definition-izing, and full-colorizing. Namely, as a recording medium used for an ink jet recording method, When the absorptivity of that the concentration of an ink dot is high and a color tone is brightly skillful and ink is early and ink-drops let laps, ink flows out or don't spread. The diffusion to the transverse direction of an ink dot is not large more than needed, and it has been required that the circumference should be smooth and should not fade etc.

[0005] in order to improve the absorptivity of the above-mentioned ink, the method of establishing the ink absorbing layer which consists of a resin binder and a white inorganic pigment in a base paper is known — this case — ink — between paints — or through between paints, it soaks through a base paper and is established. However, since such a white inorganic pigment has concealment nature, it is hard to go up the coloring density of ink. Since colorant of ink is concealed by white paints, the picture acquired tended to have lacked in the vividness.

Since the surface of a base paper will be covered only with resin if coating is carried out by sole resin on the other hand noting that I will provide the high ink absorbing layer of transparency, there was a problem that the absorptivity of ink was bad and interfered with image formation shortly. Therefore, in order to secure the absorptivity of ink, and the clear nature of a picture conventionally [both], the mixture ratio of a white inorganic pigment and a resin binder was prepared, but there was a limit in filling the above-mentioned demand for which especially ink jet recording is asked. Although the example which has provided the ink absorbing layer which has a transparent feeling using an ultrafine particle finer than the wavelength of light was indicated to JP,2-276670,A, JP,3-281383,A, and JP,6-199035,A, there was a fault that a manufacturing cost was high and flexibility was missing.

[0006]

[Problem(s) to be Solved by the Invention] then — the place which this invention is made in view

of the above-mentioned problem, and is made into the purpose has the good absorptivity of ink -- and -- the fixability of ink is not only good -- further -- high -- it is providing the manufacturing method of a recording medium and a recording medium which can acquire a clear picture.

[0007]

[Means for Solving the Problem] The absorptivity of ink in a recording medium, this invention persons, the fixability of ink, By and a thing for which a white pigment is not added, or an addition of a white pigment is stopped, and an ink absorbing layer is further made into porous structure when surveillance study is carried out about the clear nature of a picture acquired. the absorptivity of ink is good -- the fixability of ink is not only good -- further -- high -- it finds out that a clear picture is acquired and this invention is completed. That is, the manufacturing method of a recording medium and a recording medium concerning this invention is as follows.

[0008](1) A recording medium, wherein the main ingredients of this ink absorbing layer are light transmittance state resin in a recording medium which has an ink absorbing layer and this ink absorbing layer is porous structure.

(2) A recording medium given in the above (1) for which the above-mentioned porous structure is characterized by having a penetrating port penetrated to a thickness direction of an ink absorbing layer.

(3) A recording medium the above (1), wherein the above-mentioned light transmittance state resin is a water soluble polymer, or given in (2).

The above-mentioned water soluble polymer (4) Polyvinyl alcohol, cation denaturation polyvinyl alcohol, A carboxynitrocellulose, carboxymethyl cellulose, hydroxyethyl cellulose, A recording medium given in the above (3) including at least one kind in ethyl cellulose, polyacrylamide, an acrylic resin, starch, cation denaturation starch, gelatin, GAZEIN, and these denaturation compounds.

[0009](5) A recording medium given in either of above-mentioned (1) - (4), wherein the above-mentioned ink absorbing layer contains an ink fixing agent.

(6) A recording medium given in either of above-mentioned (1) - (5), wherein quantity of the above-mentioned ink absorbing layer is 0.5 g/m² - 150 g/m².

(7) A recording medium given in either of above-mentioned (1) - (6), wherein air permeability specified by air permeability JIS-P8117 is 100 or less seconds/100 cc.

(8) A recording medium given in either of above-mentioned (1) - (7), wherein the above-mentioned recording medium is a recording medium for ink jets.

[0010](9) In a manufacturing method of a recording medium which has an ink absorbing layer, coating liquid which contains light transmittance state resin as the main ingredients of this ink absorbing layer, A manufacturing method of a recording medium characterized by making this ink absorbing layer into porous structure by carrying out coating of this coating liquid to a substrate, forming a coating layer, and drying this coating layer after stirring so that detailed air bubbles may be made.

In a manufacturing method of a recording medium which has an ink absorbing layer, as the main ingredients of this ink absorbing layer, (10) Light transmittance state resin, Coating liquid containing a specific solvent which can form a hole in this ink absorbing layer by volatilizing, A manufacturing method of a recording medium carrying out coating of this coating liquid to a substrate, forming a coating layer, volatilizing this specific solvent by drying this coating layer, and making this ink absorbing layer into porous structure after stirring so that detailed particles of this specific solvent may distribute.

(11) A manufacturing method of a recording medium making coating liquid the above (9) or given in (10) contain a surface-active agent.

(12) A manufacturing method of a recording medium given in the above (11) using the above-mentioned surface-active agent as a carboxylic type polymer surfactant.

(13) A manufacturing method of a recording medium the above (11) characterized by making an addition of the above-mentioned surface-active agent into 0.1 or less copy to a material weight section which constitutes the above-mentioned coating layer, or given in (12).

[0011](14) the above — a manufacturing method of a recording medium given in the above (9) setting mean particle diameter of detailed air bubbles as 1.5 micrometers or less, (11), (12), or (13).

(15) A manufacturing method of a recording medium given in the above (10) using as the above-mentioned specific solvent a solvent of nonaqueous solubility which is while the boiling points are 50 ** – 150 **, (11), (12), or (13).

(16) A manufacturing method of a recording medium given in the above (10) using the above-mentioned specific solvent as petroleum system hydrocarbon, (11), (12), (13), or (15).

(17) A manufacturing method of a recording medium given in the above (10) setting mean particle diameter of detailed solvent particles of the above-mentioned specific solvent as 1.5 micrometers or less, (11), (12), (13), (15), or (16).

[0012](18) A manufacturing method of a recording medium given in either of above-mentioned (9) – (17) performing the above-mentioned stirring using any at least one sort of a homogenizer, a high flex time mixer, and the ultrasonic dispersion machine.

(19) A manufacturing method of a recording medium given in either of above-mentioned (9) – (18) characterized by drying the above-mentioned coating layer so that it may have a penetrating port which the above-mentioned porous structure penetrates to a thickness direction of the above-mentioned coating layer.

(20) The above (9) Manufacturing method of a recording medium making a manufacturing method of a recording medium of a statement into a manufacturing method of a recording medium for ink jets at either of – (19).

(21) A sheet like object, wherein a penetrating port penetrated to a thickness direction of this coating layer by having carried out coating of the coating liquid to a substrate, having formed a coating layer, and having stirred so that air bubbles in which are the sheet like object obtained by drying this coating layer, and the above-mentioned coating liquid is detailed might be made is formed.

(22) It is the sheet like object obtained by carrying out coating of the coating liquid to a substrate, forming a coating layer, and drying this coating layer, When a specific solvent which can form a hole in a sheet like object because the above-mentioned coating liquid volatilizes was contained, it stirred so that detailed particles of this specific solvent might distribute, and this specific solvent volatilized at the time of the above-mentioned desiccation, A sheet like object, wherein a penetrating port penetrated to a thickness direction of this coating layer is formed.

[0013](OPERATION) Even if colorant of ink does not add a white inorganic pigment which comes to be held in porosity and promotes absorption of ink by constituting the ink absorbing layer with resin of porous structure, a recording medium concerning this invention has the good absorptivity of ink, and its fixability of ink is still better. Since an ink absorbing layer is resin of a light transmittance state and a white inorganic pigment with a tendency to reduce vividness of a picture does not need to be used for it, it can reproduce colorant skillfully, therefore — the absorptivity of ink is good and the fixability of ink is good — further — high — it becomes a recording medium which can acquire a clear picture. (Claim 1)

[0014]As for a recording medium concerning this invention, the above-mentioned porous structure can raise the absorptivity of ink, and fixability further by having a penetrating port penetrated to a thickness direction of an ink absorbing layer. (Claim 2)

[0015]Since the above-mentioned light transmittance state resin is a water soluble polymer, the recording medium concerning this invention can acquire the absorptivity of high ink, and fixability, even when water-based inks, such as ink for ink jets, are used. (Claims 3 and 4)

[0016]The recording medium concerning this invention can have the absorptivity of ink which porous structure of 1 ink absorbing layer brings about, fixability, and the fixability of ink which 2 ink fixing agents bring about, when the above-mentioned ink absorbing layer contains an ink fixing agent. (Claim 5)

[0017]Since an ink absorbing layer cannot receive ink if there is too little coverage of an ink absorbing layer of a recording medium, a high-definition picture is hard to be acquired. Since an ink absorbing layer cannot become porous structure easily and there are not the absorptivity of sufficient ink and fixability even if there is much coverage of an ink absorbing layer of a recording

medium, when a droplet of ink laps, ink flows out, or it spreads and a high-definition picture is hard to be acquired. Therefore, since an ink absorbing layer can be made to be able to absorb a recording medium concerning this invention promptly and it can fix ink to it certainly when quantity of the above-mentioned ink absorbing layer is $0.5 \text{ g/m}^2 - 150 \text{ g/m}^2$, a high-definition picture is acquired. (Claim 6)

[0018]If air permeability of a recording medium is too high, since image quality where ink was not absorbed but which was excellent cannot be obtained, a recording medium concerning this invention, When air permeability specified by air permeability JIS-P8117 is 100 or less seconds/100 cc, colorant in ink can be certainly fixed to an ink absorbing layer. (Claim 7)

[0019]a recording medium concerning this invention has the good absorptivity of ink, and its fixability of ink is good — high — since a clear picture can be acquired, it can respond to ink jet recording as which the advanced characteristics, such as improvement in the speed of record, high-definition-izing, and full-color-izing, are required. (Claim 8)

[0020]After according to the manufacturing method of a recording medium concerning this invention stirring so that detailed air bubbles can do coating liquid which contains light transmittance state resin as the main ingredients of an ink absorbing layer, Coating of this solution is carried out to a substrate, a coating layer is formed, this coating layer is dried, and by making an ink absorbing layer into porous structure, even if it does not add a white inorganic pigment which promotes absorption of ink, the absorptivity of ink and fixability can consider it as a manufacturing method of a recording medium which has a good ink absorbing layer. Since it is not necessary to use a white inorganic pigment with a tendency to use resin of a light transmittance state as the main ingredients of an ink absorbing layer, and to reduce vividness of a picture, colorant can be made into a manufacturing method of a skillfully reproducible recording medium. (Claim 9)

[0021]According to the manufacturing method of a recording medium concerning this invention, as the main ingredients of an ink absorbing layer Light transmittance state resin, Coating liquid containing a specific solvent which can form a hole in an ink absorbing layer by volatilizing. By carrying out coating of this solution to a substrate, forming a coating layer, drying this coating layer, and making an ink absorbing layer into porous structure, after stirring so that detailed particles of this specific solvent may distribute. Even if it does not add a white inorganic pigment which promotes absorption of ink, the absorptivity of ink and fixability can consider it as manufacture of a recording medium which has a good ink absorbing layer. Since it is not necessary to use a white inorganic pigment with a tendency to use resin of a light transmittance state as the main ingredients of an ink absorbing layer, and to reduce vividness of a picture, colorant can be made into a manufacturing method of a recording medium reproducible skillfully (quantity vividly). (Claim 10)

[0022]according to the manufacturing method of a recording medium concerning this invention, coating liquid containing light transmittance state resin contains a surface-active agent — the above — since [which can build certainly detailed air bubbles and the above-mentioned specific solvent] it *** not but becomes difficult to carry out defoaming, it becomes easy to make the above-mentioned porous structure into a desired thing. (Claims 11 and 12)

[0023]According to the manufacturing method of a recording medium concerning this invention, it can be considered as a manufacturing method of a recording medium which a blot of a picture does not generate easily to a material weight section which constitutes the above-mentioned coating layer by making an addition of the above-mentioned surface-active agent into 0.1 or less copy. (Claim 13)

[0024]according to a manufacturing method of a recording medium concerning this invention — the above — colorant in ink can be certainly fixed to the above-mentioned porous structure by setting mean particle diameter of detailed air bubbles as 1.5 micrometers or less. (Claim 14)

[0025]According to the manufacturing method of a recording medium concerning this invention, colorant in ink can be certainly fixed to the above-mentioned porous structure by setting mean particle diameter of detailed particles of the above-mentioned specific solvent as 1.5 micrometers or less. (Claim 17)

[0026] performing the above-mentioned stirring using any at least one sort of a homogenizer, a high flex time mixer, and the ultrasonic dispersion machine according to the manufacturing method of a recording medium concerning this invention -- the above -- detailed particles of detailed air bubbles and the above-mentioned specific solvent can be created certainly. (Claim 18)

[0027] According to the manufacturing method of a recording medium concerning this invention, the absorptivity of ink and fixability can be further raised by drying the above-mentioned coating layer so that it may have a penetrating port which the above-mentioned porous structure penetrates to a thickness direction of the above-mentioned coating layer. (Claim 19)

[0028] According to the manufacturing method of a recording medium concerning this invention, the absorptivity of ink is good and the fixability of ink is good, high -- since a recording medium which can acquire a clear picture can be manufactured, it can be considered as a manufacturing method which can respond to ink jet recording as which the advanced characteristics, such as improvement in the speed of record, high-definition-izing, and full-color-izing, are required. (Claim 20)

[0029] A sheet like object concerning this invention is stirred so that detailed air bubbles can do coating liquid, can carry out coating of this coating liquid to a sheet shaped substrate, can form a coating layer, and can use it as a sheet like object in which a penetrating port penetrated to a thickness direction of a coating layer was formed, by drying this coating layer. (Claim 21)

[0030] A sheet like object concerning this invention adds a specific solvent which can form a hole in a sheet like object in coating liquid, and it stirs it so that detailed particles of a specific solvent may distribute. It can be considered as a sheet like object in which a penetrating port penetrated to a thickness direction of a coating layer was formed, by carrying out coating of this coating liquid to a sheet shaped substrate, forming a coating layer, drying this coating layer, and volatilizing this specific solvent. (Claim 22)

[0031]

[Embodiment of the Invention] Although the desirable embodiment of this invention is illustrated below, this invention is not limited to following embodiments and can be suitably changed within the limits of the matter which specifies the aforementioned invention.

[0032] [Ink absorbing layer] The recording medium of the embodiment concerning this invention has an ink absorbing layer which the main ingredients are light transmittance state resin, and is porous structure. As for the absorptivity and the fixable viewpoint of ink to this porous structure, it is more preferred to have a penetrating port penetrated to the thickness direction of an ink absorbing layer. Especially if it is a light transmittance state as light transmittance state resin which is the main ingredients of an ink absorbing layer, will not be limited, but [especially] in recording a picture using a water-based ink with an inkjet method, Since a quality picture is acquired by making high the absorptivity of the ink to a recording medium, and fixability, it is preferred that it is a water soluble polymer. As a water soluble polymer, polyvinyl alcohol (PVA), cation denaturation polyvinyl alcohol (cation denaturation PVA), A carboxynitrocellulose (CNC), carboxymethyl cellulose (CMC), It is preferred for hydroxyethyl cellulose (HEC), ethyl cellulose (EC), polyacrylamide (Pulse Amplitude Modulation), starch, cation denaturation starch, gelatin, GAZEIN, and these denaturation compounds to be mentioned, and to include at least one kind among these.

[0033] As oleophilic polymers of a light transmittance state, styrene-butadiene-rubber latex (SBR latex), Conjugated diene system copolymerization latex, such as methyl methacrylate butadiene rubber latex (MBR latex), Polyacrylonitrile, polyvinyl chloride, a polyvinylidene chloride, polyethylene, polypropylene, melamine resin, urea resin, a VCM/PVC vinyl acetate copolymer, an alkyd resin, etc. are mentioned. As for the content of these light transmittance state resin, 50 to 100 % of the weight is preferred to the total dry weight of an ink absorbing layer, and it is 85 to 98% of the weight of a range more preferably. In this specification, a light transmittance state includes both water-white nature and colored transparency.

[0034] As for the above-mentioned ink absorbing layer, in order to compensate the fixability of ink, it is preferred to contain an ink fixing agent. Especially as an ink fixing agent, a cationic compound is preferred and the low molecular weight compound which has the 1st class - tertiary

amine, or a quarternary-ammonium-salt group, the oligomer which has those bases, or the polymer which has those bases is mentioned. Specifically Diaryl methylammonium salt polymer, such as diaryl dimethylammoniumchloride polymer, a diaryl dimethylammoniumchloride sulfur dioxide copolymer, and a diaryl dimethylammoniumchloride acrylamide copolymer, A diaryl amine salt acid chloride-sulfur dioxide copolymer, a diarylmethylamine hydrochloride copolymer, Ionenone containing polyallylamine, polyethyleneimine, a polyethyleneimine quarternary-ammonium-salt compound, acrylic acid (meta) alkyl-ammonium-salt polymer, acrylamide (meta) alkyl-ammonium-salt polymer, and quarternary ammonium salt can be mentioned. As for the content of these ink fixing agents, 5 to 40 % of the weight is preferred to the total dry weight of an ink absorbing layer, and it is 10 to 30% of the weight of a range more preferably.

[0035]In an ink absorbing layer, if the light transmittance state is not barred, the publicly known ultraviolet ray absorbent for making ultraviolet rays absorb, other additive agents, for example, a penetrating agent, a water retention agent, a cationic polymer electrolyte, etc. may be added if needed. As for the content of these additive agents, 1 to 20 % of the weight is preferred to the total dry weight of an ink absorbing layer, and it is 5 to 10% of the weight of a range more preferably.

[0036][Substrate] As a base of the recording medium of the embodiment concerning this invention, the sheet shaped thing made from paper or a plastic is used, and each of things of a light transmittance state or things of light impermeability nature can be used. As such a substrate, can use each publicly known substrate conventionally, for example, as paper, Natural cellulose textiles are mentioned by what comprises the pulp raw material of the wood pulp made into the subject, or non-wood pulp, and them as plastic material, Polyester system resin, diacetate system resin, triacetate system resin, acrylic resin, polycarbonate system resin, polyvinyl chloride system resin, polyimide system resin, cellophane, celluloid, etc. are mentioned.

[0037][Manufacture of a recording medium] After stirring the coating liquid which dissolved each ingredient of the above-mentioned ink absorbing layer in the suitable solvent so that detailed air bubbles may be made, coating of this coating liquid is carried out to a substrate, a coating layer is formed, and the recording medium with which an ink absorbing layer serves as porous structure is manufactured by drying this coating layer.

[0038](Ingredient of coating liquid)

(1) When light transmittance state resin is a water soluble polymer and light transmittance state resin is a water soluble polymer, the coating liquid of an ink absorbing layer dissolves water soluble resin in water, and is obtained by adding the above-mentioned ink fixing agent and an additive agent if needed further. Next, after stirring so that detailed air bubbles can do this coating liquid, an ink absorbing layer serves as porous structure by carrying out coating of the coating liquid to the above-mentioned substrate, and drying it, before carrying out defoaming. The content to the coating liquid full weight of such a water soluble polymer is 85 to 98% of the weight of a range preferably [that it is in 50 to 100% of the weight of the range], and more preferably.

[0039]On the other hand, "the specific solvent which can form a hole in an ink absorbing layer by volatilizing" is further added in this coating liquid, After stirring so that the detailed particles of this specific solvent may distribute, it is possible to carry out coating of this coating liquid to a substrate, to form a coating layer, to volatilize a specific solvent and to also make porous structure form by drying this coating layer. That is, in this case, the above-mentioned specific solvent is volatilized and dispersed in a drying process, and it becomes porous structure.

According to this technique, an aperture can be controlled by changing the ratio of water to a specific solvent, and a porous mechanical design is still easier. (The inside of detailed [this], that it is "microscopic" means that the mean particle diameter of the particles of air bubbles or a specific solvent is 1.5 micrometers or less.)

[0040]When light transmittance state resin is a water soluble polymer, the main solvent of coating liquid from becoming water. As for "the specific solvent which can form a hole in an ink absorbing layer by volatilizing", it is preferred that it is a solvent of nonaqueous solubility and the boiling points are 50 ** - 150 **, and petroleum system hydrocarbon, such as hexane, pentane, and cyclohexane, benzene, etc. are mentioned as a solvent of such nonaqueous solubility. The

content to the coating liquid full weight of the solvent of such nonaqueous solubility is 10 to 30% of the weight of a range preferably [that it is in 1 to 40% of the weight of the range], and more preferably.

[0041]Irrespective of the existence of the specific solvent which can form a hole in an ink absorbing layer by describing above " volatilizing in order to compensate formation of porous structure", It is preferred to add a surface-active agent in coating liquid, and the surface-active agent which makes underwater distributed emulsions, such as a carboxylic type polymer surfactant and a dialkyl sulfo amber acid derivative, is used suitably. As for the addition of such a surface-active agent, it is preferred that it is 0.1 or less copy to the material weight section which constitutes a coating layer.

[0042](2) When light transmittance state resin is oleophilic polymers and light transmittance state resin is oleophilic polymers, the coating liquid of an ink absorbing layer dissolves oleophilic resin in an oleophilic solvent, and is obtained by adding the above-mentioned ink fixing agent and an additive agent if needed further. Next, after stirring like **** so that detailed air bubbles can do coating liquid, an ink absorbing layer serves as porous structure by carrying out coating of the coating liquid to the above-mentioned substrate, and drying it, before carrying out defoaming. The content to the coating liquid full weight of such oleophilic polymers is 85 to 98% of the weight of a range preferably [that it is in 50 to 100% of the weight of the range], and more preferably.

[0043]Also when light transmittance state resin is oleophilic polymers, "the specific solvent which can form a hole in an ink absorbing layer by volatilizing" is further added in this coating liquid. After stirring so that the detailed particles of this specific solvent may distribute, it is possible to carry out coating of this coating liquid to a substrate, to form a coating layer, to volatilize a specific solvent and to also make porous structure form by drying this coating layer. According to this technique, an aperture can be controlled by changing the ratio of an oleophilic solvent to a specific solvent, and a porous mechanical design is easy. When light transmittance state resin is oleophilic polymers, since the main solvent of coating liquid turns into an oleophilic solvent, "the specific solvent which can form a hole in an ink absorbing layer by volatilizing" is a hydrophilic solvent.

[0044]As the above-mentioned oleophilic solvent, hexane, cyclohexane, chloroform, ethyl acetate, and acetone are mentioned, and hexane and cyclohexane are preferred especially. As the above-mentioned hydrophilic solvent, water and low-molecular-weight alcohol are mentioned and especially water is preferred. The content to the coating liquid full weight of such a hydrophilic solvent is 10 to 25% of the weight of a range preferably [that it is in 5 to 50% of the weight of the range], and more preferably.

[0045]In order to compensate formation of porous structure, irrespective of the existence of the above "specific solvent which can form a hole in an ink absorbing layer by volatilizing", it is preferred to add a surface-active agent in coating liquid, and the surface-active agent which makes the distributed emulsion in an oil is used suitably. As for the addition of such a surface-active agent, it is preferred that it is 0.1 or less copy to the material weight section which constitutes a coating layer.

[0046](Stirring of coating liquid) The coating liquid containing each above-mentioned ingredient, In order that colorant in ink may consider it as the ink absorbing layer of the porous structure to which it is absorbed promptly and fixed certainly although what kind of stirring means may be used if the above "detailed air bubbles" and the above "detailed particles of a specific solvent" are generated and distributed, It is preferred to make it the mean particle diameter of "detailed air bubbles" and "the detailed particles of a specific solvent" set to 1.5 micrometers or less (mean particle diameter is measured, for example using a laser diffraction type size distribution measuring device.). Therefore, agitating equipment, such as homogenizers (a pressure type homogenizer or a high voltage type homogenizer), a high flex time mixer, and an ultrasonic dispersion machine, is used suitably. When using a pressure type homogenizer or a high voltage type homogenizer, more specifically, When carrying out processing of 1 hours or more at 12000 rpm when carrying out processing of 1 hours or more with the process pressure more than 800

kg/cm² and using a high flex time mixer, and using an ultrasonic dispersion machine, it is preferred to carry out processing of 1 hours or more at 20 kHz.

[0047](Coating to the substrate of coating liquid) While the light transmittance state resin above "detailed air bubbles" and "the detailed particles of a specific solvent" are distributing within coating liquid, it is necessary to perform the coating process to the substrate of the coating liquid created as mentioned above, and the drying process performed successively. The coating of the above-mentioned ink absorbing layer The roll coating method, a spray coating method, It is carried out by the coating method using a rod bar coating method, the air-knife-coating method, the one machine coating machine (for example, gate roll coater, a size press coating machine) direct connected to a braid coating machine, a photogravure coating machine, and a paper machine, etc. Since a high-definition picture is acquired, it is preferred that the quantity of the ink absorbing layer after desiccation carries out coating so that it may become 0.5 g/m² to 150 g/m². Because, since an ink absorbing layer cannot receive ink if there is too less coverage of the ink absorbing layer of a recording medium than 0.5 g/m². Since an ink absorbing layer cannot become porous structure easily and there are not the absorptivity of sufficient ink and fixability even if a high-definition picture is hard to be acquired and there is much coverage of an ink absorbing layer, It is because a high-definition picture is hard to be acquired by ink's flowing out or spreading when the droplet of ink laps.

[0048](Desiccation of coating liquid) Desiccation of coating liquid by which coating was carried out to the substrate can be performed using a common dryer. Although drying temperature and drying time can be suitably changed according to the presentation of the coating liquid to be used, the kind of specific solvent which can form a hole in an ink absorbing layer by describing above " volatilizing", etc., it is generally performed in 100-150 **.

[0049]A scanning electron microscope (SEM) can perform the check of the porous structure of the ink absorbing layer of the recording medium obtained as mentioned above. In order to fix colorant in ink to an ink absorbing layer certainly since the image quality where ink was not absorbed but which was excellent cannot be obtained if the air permeability of a recording medium is too high, It is preferred to carry out air permeability specified by air permeability JIS-P8117 of the recording medium in 100 or less seconds/[100 cc and] by adjusting the manufacturing conditions of recording media, such as composition ratio of the above-mentioned coating liquid, stirring conditions, and stirring conditions.

[0050]Since the absorptivity of ink is good and the fixability of ink is good, the recording medium obtained by carrying out in this way is suitably used as a recording medium for ink jets with which the advanced characteristics, such as improvement in the speed of record, high-definition-izing, and full-color-izing, are demanded.

[0051]Although the method of recording as the method of record using the recording medium concerning this invention using an ink-jet recording device is desirable, the method which it is not limited to an ink jet recording method in particular, and is recorded using the pens and pencils of publicly known ink use may be used.

[0052]In the above-mentioned embodiment, although explained centering on the recording medium, especially the recording medium for ink jets, this invention is not limited to this and can be used as a common sheet like object. By namely, the thing for which it stirs so that detailed air bubbles can do coating liquid, and coating of this coating liquid is carried out to a sheet shaped substrate, a coating layer is formed, and this coating layer is dried. It can be considered as the sheet like object in which the penetrating port penetrated to the thickness direction of a coating layer was formed, for example, can apply to a filter, an absorber, a deodorizing material, etc. As other gestalten of a sheet like object, add the specific solvent which can form a hole in a sheet like object in coating liquid, and it stirs so that the detailed particles of a specific solvent may distribute. It can also be considered as the sheet like object in which the penetrating port penetrated to the thickness direction of a coating layer was formed, by carrying out coating of this coating liquid to a sheet shaped substrate, forming a coating layer, drying this coating layer, and volatilizing this specific solvent. "The specific solvent which can form a hole in a sheet like object by volatilizing" is the same as the above-mentioned "specific solvent which can form a

hole in an ink absorbing layer."

[0053]

[Example] Next, this invention is not limited by the following examples, although Examples 1-4 and the comparative examples 1 and 2 are given and this invention is explained concretely. First, the manufacturing method of the recording medium used for Examples 1-4 and the comparative examples 1 and 2 is explained. The substrate was used as the paper of fine quality of weighing 100 g/m², and coating of the coating liquid used by Examples 1-4 and the comparative examples 1 and 2 which are shown in this paper of fine quality below was carried out so that it might become a coating amount of 15 g/m². After coating, using the dryer (DABAI S peck incorporated company make, PH-201 type oven), 130 ** and desiccation for 2 minutes were performed, and it was considered as the recording medium used in each example, respectively.

[0054] (Coating liquid used in Example 1) According to the following presentation, what was stirred by processing the solution obtained by considering it as 15% of the weight of solution as the total additive density for 60 minutes by the pressure of 850 kg/cm² using a high voltage type homogenizer (SMT incorporated company make, GM-1) was used as coating liquid.

– Light transmittance state resin : polyvinyl alcohol CM318 (trade name of CRALAY CO., LTD.) (degree of polymerization 1800) 15 % of the weight and water The place which measured the mean particle diameter of the air bubbles in residue coating liquid with the laser diffraction size distribution measuring device (Made by Shimadzu SALAD 2000J), It was 1.5 micrometers or less.

[0055] (Coating liquid used in Example 2) According to the following presentation, what was stirred by processing the solution obtained by considering it as 20% of the weight of solution as the total additive density for 60 minutes by the pressure of 850 kg/cm² using a high voltage type homogenizer (SMT incorporated company make, GM-1) was used as coating liquid.

– light transmittance state resin: — polyvinyl alcohol CM318 (degree of polymerization 1800) (trade name of CRALAY CO., LTD.) 15-% of the weight and ink fixing agent: — diaryl dimethylammoniumchloride sulfur dioxide copolymer PAS-A (trade name of Nitto Boseki Co., Ltd.). 5 % of the weight and water When the mean particle diameter of the air bubbles in residue coating liquid was measured with the laser diffraction size distribution measuring device (Made by Shimadzu SALAD 2000J), it was 1.5 micrometers or less.

[0056] (Coating liquid used in Example 3) According to the following presentation, what was stirred by processing the solution obtained by considering it as 30% of the weight of solution as the total additive density for 60 minutes by the pressure of 850 kg/cm² using a high voltage type homogenizer (SMT incorporated company make, GM-1) was used as coating liquid.

– light transmittance state resin: — polyvinyl alcohol CM318 (degree of polymerization 1800) (trade name of CRALAY CO., LTD.) 15-% of the weight and ink fixing agent: — diaryl dimethylammoniumchloride sulfur dioxide copolymer PAS-A (trade name of Nitto Boseki Co., Ltd.). 5 % of the weight and cyclohexane 10 % of the weight and water When the mean particle diameter of cyclohexane in residue coating liquid was measured with the laser diffraction size distribution measuring device (Shimadzu SALAD2000J), it was 1.5 micrometers or less.

[0057] (Coating liquid used in Example 4) According to the following presentation, it is considered as 20.1% of the weight of solution as the total additive density, What was stirred by processing the obtained solution for 60 minutes by the pressure of 850 kg/cm² using a high voltage type homogenizer (SMT incorporated company make, GM-1) was used as coating liquid.

– Light transmittance state resin : polyvinyl alcohol CM318 (trade name of CRALAY CO., LTD.) (degree of polymerization 1800) 15 % of the weight and a carboxylic-type polymer surfactant: DEMORUP (trade name of Kao Corp.)

0.1 % of the weight and an ink fixing agent: It is a laser diffraction size distribution measuring device (Shimadzu Corp. make .) about the mean particle diameter of the air bubbles in diaryl dimethylammoniumchloride sulfur dioxide copolymer residue coating liquid. PAS-A (trade name of Nitto Boseki Co., Ltd.) 5 % of the weight and water When measured by SALAD 2000J, it was 1.5 micrometers or less.

[0058](Coating liquid used in Example 5) According to the following presentation, it is considered as 30.1% of the weight of solution as the total additive density. What was stirred by processing the obtained solution for 60 minutes by the pressure of 850 kg/cm² using a high voltage type homogenizer (SMT incorporated company make, GM-1) was used as coating liquid.

– Light transmittance state resin : polyvinyl alcohol CM318 (trade name of CRALAY CO., LTD.) (degree of polymerization 1800) 15 % of the weight and a carboxylic-type polymer surfactant: DEMORUP (trade name of Kao Corp.)

0.1 % of the weight and an ink fixing agent: Diaryl dimethylammoniumchloride sulfur dioxide copolymer PAS-A (trade name of Nitto Boseki Co., Ltd.) 5 % of the weight and cyclohexane 10 % of the weight and water. The mean particle diameter of cyclohexane in residue coating liquid. When measured with the laser diffraction size distribution measuring device (Made by Shimadzu SALAD 2000J), it was 1.5 micrometers or less.

[0059](Coating liquid used by the comparative example 1) Agitating equipment was used as low-speed agitating equipment (the product made by HEIDON, a three one motor) instead of the homogenizer, and coating liquid was obtained like Example 1 by 200 rpm of agitating speed except [of 4 minutes] having stirred. Although coating liquid was measured with the laser diffraction size distribution measuring device (Shimadzu SALAD2000J), detailed air bubbles were not able to be checked.

[0060](Coating liquid used by the comparative example 2) Agitating equipment was used as low-speed agitating equipment (the product made by HEIDON, a three one motor) instead of the homogenizer, and coating liquid was obtained like Example 2 by 200 rpm of agitating speed except [of 4 minutes] having stirred. Although coating liquid was measured with the laser diffraction size distribution measuring device (Shimadzu SALAD2000J), detailed air bubbles were not able to be checked.

[0061](Structure check of the ink absorbing layer in a recording medium) It was checked that the ink absorbing layer of the above-mentioned recording medium used in Examples 1–5 has porous structure with the scanning electron microscope (JEOL Co., Ltd. make JXA-840). However, all over the ink absorbing layer of the above-mentioned recording medium used by the comparative examples 1 and 2, a hole was hardly able to be checked.

[0062](Absorptivity examination of ink) The absorptivity of ink using the obtained recording medium (sample) by the above-mentioned example and a comparative example by SEIKO EPSON ink-jet printer PM-770C. **** of the cross-joint white of a 0.5-mm space as shown in drawing 1 was used as the pattern, the patch located in a line so that this pattern might adjoin in KCMYRGB each color was printed, the narrowing grade of the width of a cross-joint white portion was observed after desiccation, and it evaluated as follows.

A 0.5-mm space could be checked and it became the space beyond :a0.45mm which did not spread. : It became a space below b0.45mm. : c [0063](Clear sex test of a picture) The recording medium (sample) obtained by the above-mentioned example and the comparative example is used again. It prints by SEIKO EPSON ink-jet printer PM-770C, The image name portrait (the sample number 1, the identification number N1 of a picture) of highly minute color digital normal standard image data (ISO/JIS-SCID) was printed, and viewing estimated the clear nature of the picture as follows.

:A picture by which the picture is reproduced skillfully is indistinct : B — the test result of these is shown in Table 1.

[0064]

[Table 1]

	インクの吸収性	画像の鮮明性
実施例 1	b	A
実施例 2	a	A
実施例 3	a	A
実施例 4	a	A
実施例 5	a	A
比較例 1	c	A
比較例 2	b	B

[0065]When the recording medium (examples 1–5) concerning this invention was used, ink absorbency equivalent to "bleeding" and the case where "oozing out" to a white ground was not checked, but the SEIKO EPSON paper only for super fine one is used during an adjoining patch was able to be acquired. It reappeared skillfully and the picture in the clear sex test was able to obtain picture clear nature equivalent to the case where the SEIKO EPSON paper only for super fine one is used. On the other hand, although the picture in the clear sex test was skillfully reproduced when the recording medium of the comparative example 1 was used, the absorptivity of ink was low and "oozing out" to "bleeding" and the white ground during an adjoining patch was checked. When the recording medium of the comparative example 2 was used, the absorptivity of ink was good and "bleeding" and the picture in the clear sex test although "oozing out" to a white ground was not checked during an adjoining patch became indistinct.

[0066]

[Effect of the Invention]According to the recording medium concerning this invention, by constituting the ink absorbing layer with resin of porous structure, Even if colorant of ink does not add the white inorganic pigment which comes to be held in porosity and promotes absorption of ink, the absorptivity of ink is good and the fixability of ink is still better. Since an ink absorbing layer is resin of a light transmittance state and a white inorganic pigment with the tendency to reduce the vividness of a picture does not need to be used for it, it can reproduce colorant skillfully. therefore — the absorptivity of ink is good and the fixability of ink is good — further — high — the recording medium which can acquire a clear picture can be provided. (Claim 1)

[0067]the absorptivity of ink and fixability improve further by having a penetrating port which the above-mentioned porous structure penetrates to the thickness direction of an ink absorbing layer according to the recording medium concerning this invention — very — high — the recording medium which can acquire a clear picture can be provided. (Claim 2)

[0068]since the above-mentioned light transmittance state resin is a water soluble polymer according to the recording medium concerning this invention, even when water-based inks, such as ink for ink jets, are used, the absorptivity of high ink and fixability can be acquired — high — the recording medium which can acquire a clear picture can be provided. (Claims 3 and 4)

[0069]According to the recording medium concerning this invention, when the above-mentioned ink absorbing layer contains an ink fixing agent, 1) since it can have the absorptivity of the ink which the porous structure of an ink absorbing layer brings about, fixability, and the fixability of the ink which 2 ink fixing agents bring about, the absorptivity of ink and fixability are very high — high — the recording medium which can acquire a clear picture can be provided. (Claim 5)

[0070]According to the recording medium concerning this invention, when the quantity of the above-mentioned ink absorbing layer is 0.5 g/m^2 – 150 g/m^2 . Since it has the absorptivity of sufficient ink, and fixability, and an ink absorbing layer can be made to be able to absorb ink promptly and it can be certainly fixed to it, the recording medium which can acquire a high-definition picture can be provided. (Claim 6)

[0071]when the air permeability specified by air permeability JIS-P8117 is 100 or less seconds/100 cc according to the recording medium concerning this invention, colorant in ink can be certainly fixed to an ink absorbing layer — high — the recording medium which can acquire a clear picture can be provided. (Claim 7)

[0072]according to the recording medium concerning this invention, the absorptivity of ink is good and the fixability of ink is good — high — since a clear picture can be acquired, the recording medium which can respond to the ink jet recording as which the advanced characteristics, such as improvement in the speed of record, high-definition-izing, and full-color-izing, are required can be provided. (Claim 8)

[0073]After according to the manufacturing method of the recording medium concerning this invention stirring so that detailed air bubbles can do the coating liquid which contains light transmittance state resin as the main ingredients of an ink absorbing layer, Since carry out coating of this solution to a substrate, a coating layer is formed, this coating layer is dried and an ink absorbing layer is made into porous structure, even if it does not add the white inorganic

pigment which promotes absorption of ink, the manufacturing method of the recording medium with which the absorptivity of ink and fixability have a good ink absorbing layer can be provided. Since it is not necessary to use a white inorganic pigment with the tendency to use resin of a light transmittance state as the main ingredients of an ink absorbing layer, and to reduce the vividness of a picture, the manufacturing method of the recording medium which can reproduce colorant skillfully can be provided. (Claim 9)

[0074]According to the manufacturing method of the recording medium concerning this invention, as the main ingredients of an ink absorbing layer Light transmittance state resin, The coating liquid containing the specific solvent which can form a hole in an ink absorbing layer by volatilizing, Since carry out coating of this solution to a substrate, a coating layer is formed, this coating layer is dried and an ink absorbing layer is made into porous structure after stirring so that the detailed particles of this specific solvent may distribute, Even if it does not add the white inorganic pigment which promotes absorption of ink, manufacture of the recording medium with which the absorptivity of ink and fixability have a good ink absorbing layer can be provided. Since it is not necessary to use a white inorganic pigment with the tendency to use resin of a light transmittance state as the main ingredients of an ink absorbing layer, and to reduce the vividness of a picture, the manufacturing method of the recording medium which can reproduce colorant skillfully (quantity vividly) can be provided. (Claim 10)

[0075]according to the manufacturing method of the recording medium concerning this invention, the coating liquid containing light transmittance state resin contains a surface-active agent — the above, since [which can build certainly detailed air bubbles and the above-mentioned specific solvent] it *** not but becomes difficult to carry out defoaming, it is easy to make the above-mentioned porous structure into a desired thing — high — the recording medium which can acquire a clear picture can be manufactured certainly. (Claims 11 and 12)

[0076]According to the manufacturing method of the recording medium concerning this invention, the manufacturing method of the recording medium which a blot of a picture does not generate easily can be provided to the material weight section which constitutes the above-mentioned coating layer by making the addition of the above-mentioned surface-active agent into 0.1 or less copy. (Claim 13)

[0077]according to the manufacturing method of the recording medium concerning this invention — the above — since colorant in ink can be certainly fixed to the above-mentioned porous structure by setting the mean particle diameter of detailed air bubbles as 1.5 micrometers or less — high — the manufacturing method of the recording medium which can acquire a clear picture can be provided. (Claim 14)

[0078]Since colorant in ink can be certainly fixed to the above-mentioned porous structure by setting the mean particle diameter of the detailed particles of the above-mentioned specific solvent as 1.5 micrometers or less according to the manufacturing method of the recording medium concerning this invention, high — the manufacturing method of the recording medium which can acquire a clear picture can be provided. (Claim 17)

[0079]According to the manufacturing method of the recording medium concerning this invention, by performing the above-mentioned stirring using any at least one sort of a homogenizer, a high flex time mixer, and the ultrasonic dispersion machine, the above — the detailed particles of detailed air bubbles and the above-mentioned specific solvent can be created certainly — high — the recording medium which can acquire a clear picture can be manufactured certainly. (Claim 18)

[0080]By drying the above-mentioned coating layer so that it may have a penetrating port which the above-mentioned porous structure penetrates to the thickness direction of the above-mentioned coating layer according to the manufacturing method of the recording medium concerning this invention. the absorptivity of ink and fixability improve further — very — high — the manufacturing method of the recording medium which can acquire a clear picture can be provided. (Claim 19)

[0081]According to the manufacturing method of the recording medium concerning this invention, the absorptivity of ink is good and the fixability of ink is good, high — since the recording medium which can acquire a clear picture can be manufactured, the manufacturing

method of the recording medium which can respond to the ink jet recording as which the advanced characteristics, such as improvement in the speed of record, high-definition-izing, and full-color-izing, are required can be provided. (Claim 20)

[0082]By according to the sheet like object concerning this invention, stirring so that detailed air bubbles can do coating liquid, carrying out coating of this coating liquid to a sheet shaped substrate, forming a coating layer, and drying this coating layer. It can be considered as the sheet like object in which the penetrating port penetrated to the thickness direction of a coating layer was formed, and can apply to wide range fields, such as a filter, an absorber, and a deodorizing material. (Claim 21)

[0083]According to the sheet like object concerning this invention, add the specific solvent which can form a hole in a sheet like object in coating liquid, and it stirs so that the detailed particles of a specific solvent may distribute, By carrying out coating of this coating liquid to a sheet shaped substrate, forming a coating layer, drying this coating layer, and volatilizing this specific solvent. It can be considered as the sheet like object in which the penetrating port penetrated to the thickness direction of a coating layer was formed, and can apply to wide range fields, such as a filter, an absorber, and a deodorizing material. (Claim 22)

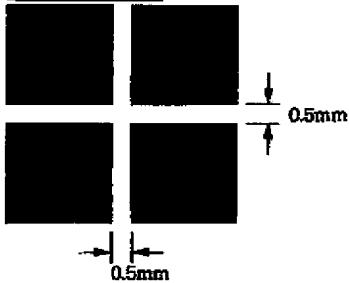
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DRAWINGS

[Drawing 1]

[Translation done.]